

REMARKS

INTERVIEW

Applicants thank the Examiner for granting the interview and for his helpful comments and suggestions in advancing prosecution of this application.

The summary of the interview is thoroughly reflected in the Interview Summary mailed on March 18, 2008, and the Advisor Action mailed on March 21, 2008.

CLAIM 18

Claim 18 is amended as suggested by the Examiner. Support for the amendment can be found, e.g., on page 32, e.g., on lines 10-12.

CLAIM 43

The term "heterocycloaliphatic" is further clarified explicitly in the claim that it is a cycloaliphatic radical having heteroatoms in the ring. Thus, the rejection should be withdrawn.

CLAIMS REJECTED DUE TO USING THE TERM "DITERTIARY DISPHOSPHINE"

The Examiner alleges that there is a conflict between the definitions of the diphosphines in claims 14 and 18. Applicants respectfully disagree with the allegations and request that the Examiner consider the following comments.

In summary it is valid that:

- The diphosphines can be identical (in claims 14 and 18, while claim 16 refers to a specific class of diphosphines), however the reaction medium of claim 18 ("aqueous") requires that the diphosphines are water-soluble. For said purpose the diphosphines are part of (or formulated as compounds) of formula XVIII, which assures that the diphosphines are soluble in an aqueous medium.
- There are two ways to attach the disphosphine (skeleton) to the water-soluble group $-\text{C}(\text{O})-\text{NR}_{42}-\text{CR}_3$, namely first if possible via a direct bond, or second via the help of a bridging group.

The bridging group (obviously present between the $-\text{C}(\text{O})$ -group and the diphosphine skeleton is not restricted to alkylanes, however, may contain heteroatoms, which is sufficiently clear from the description.

- The nature/definition of R_{41} is thus sufficiently clear from the description.
The above conclusions can be supported by the following analysis.

a) Summary of claims 14, 16 and 18:

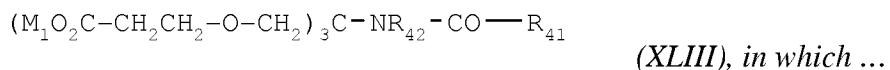
Claims 14, 16, and 18 as currently on file on file read as follows:

“14. ... that is soluble in the reaction medium, wherein the catalyst has a ligand that is an achiral or chiral ditertiary diphosphine”

“16. ... according to claim 14 wherein the reaction medium is an alcoholic reaction medium and the diphospine is of formula IV

$R_4R_5P-R_6-PR_7R_8$ (IV) in which”

“18. ... according to claim 14 wherein the reaction medium is an aqueous reaction medium and the diphospine is [part] of formula XLIII



R_{41} is a monovalent radical of a ditertiary diphosphine, with the CO group being attached directly to a carbon or nitrogen atom of R_{41} , or to an oxygen or nitrogen atom or to a carbon atom of a bridging group present between the CO group and R_{41} .”

That means claim 14 claims a ditertiary diphosphine, which more specifically can be a ditertiary diphosphine of formula (IV) according to claim 16, or can be a ditertiary diphosphine which is bound to a water-soluble group in a specific and defined way according to claim 18.

b) Comments on “reaction medium” and formula (XLIII):

Further in claim 14 the catalyst (the metal complex with ligands) is soluble in the “reaction medium”. In claim 16 the catalyst is soluble in “an alcoholic reaction medium”.

However, in claim 18 the reaction medium is defined as being “an aqueous reaction medium”. Therefore, it is necessary that the diphosphines are “water-soluble”. See the respective paragraph bridging pages 28 and 29:

“Such diphosphines contain one or more water-solubilising polar substituents which are attached to substituents of the phosphine group and/or to the skeleton diphosphine, either direct or via a bridging group. The diphosphines may be the same achiral and chiral ditertiary

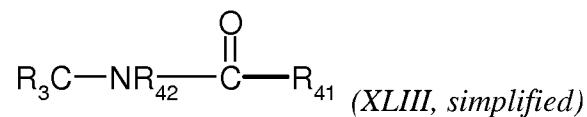
diphosphines as were defined earlier, including the preferences, which in addition contain water-solubilising polar substituents.”

Consequently, the diphosphines of claim 18 have to be water-soluble ones due to the (chosen) reaction medium. This is done by binding the diphosphines to a polar group $-\text{CO}-\text{NR}_{42}-\text{CR}_3$. Otherwise, it is clear that the diphosphines claimed in claim 14 and 18 can be selected from the same diphosphines as described in the description beginning with the last paragraph of page 18.

c) Comment on radical R_{41} :

As already mentioned in the earlier communication, claim 18 is based on, e.g., the following part of the description (begins end of page 30), which states that:

“A further preferred group of water-soluble diphosphines are those of formula XLIII,



in which

...

d) R_{41} is the monovalent radical of a chiral ditertiary diphosphine,

the CO group being attached directly

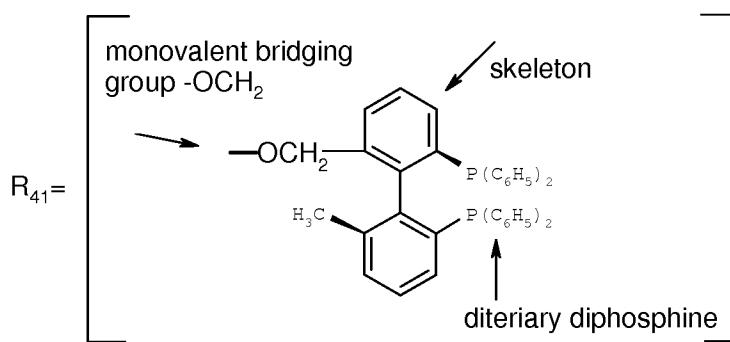
a) to a carbon or nitrogen atom of the diphosphine skeleton, or

b) to an oxygen or nitrogen atom or to a carbon atom of a bridging group of the diphosphine skeleton.”

Therefore, the diphosphines - or if using the above wording “the diphosphine skeletons” - are bound to the polar group directly (if possible) or with the help of a bridging group.

Two examples should illustrate the possible alternatives as follows:

First an **example for variant b)**, taken from preferred examples as mentioned on page 31, namely the $\text{C}(\text{O})$ -group being directly attached to an (in this example) oxygen of a **bridging group** $[-\text{O}-\text{CH}_2-]$ of the diphosphine skeleton:



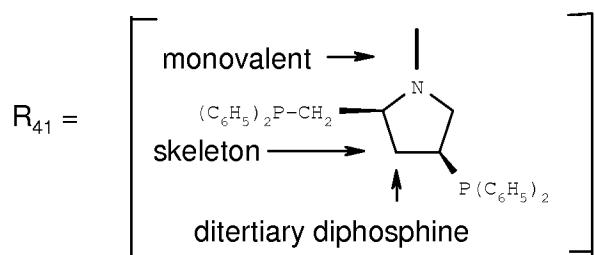
R_{41} is monovalent as it is bound directly (thus monovalent) to the C(O)-group.

Both phosphines of the diphosphine are tertiary, thus we have a ditertiary diphosphine.

We have a bridging group $[-O-CH_2-]$ as the diphosphine skeleton is not directly attached to the C(O)-group.

See also instant Examples for hydrogenations in aqueous reaction medium on pages 40, 41 using “R-W-BIPHEMP”, “2S,4S-W-BPPM”, “W-PYRPHOS”, “W-XYLIPHOS”, and “W-XYLIPHOS” ditertiary diphosphines.

Second an **example for variant a)**, also taken from preferred examples as mentioned on page 31, namely the C(O)-group being directly attached to an (in this example) nitrogen atom of the diphosphine skeleton:



See also instant Examples for hydrogenations in alcoholic reaction medium on pages 39 and 40 using “R-BINAP”, “R-BINAP”, “S,S-JOSIPHOS”, “S,S-BPPFA”, and “S,S-BPPFOH” as ditertiary diphosphines.

In summary R_{41} is a monovalent radical, the radical comprises a monovalent skeleton bearing two phosphine groups, thus bearing in short “a diphosphine”, the skeleton thereof is

- a) either directly attached to the C(O)-group, or,
- b) attached with the help of a bridging group to the polar group.

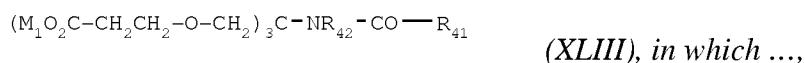
e) Comment on wording of claim 18:

See page 31 stating that:

“R₄₁ is the monovalent radical of a chiral ditertiary diphosphine, the CO group being directly attached to a carbon or nitrogen atom of the diphosphine skeleton, or to an oxygen or nitrogen atom or to a carbon atom of a bridging group of the diphosphine skeleton. Examples of suitable bridging groups include -O-, -NH-, C₁-C₆-alkylene-, -N(C₁-C₄-alkyl)-, -O-C₁-C₆-alkylene-, -NH-C₁-C₆-alkylene- and -N(C₁-C₄-alkyl)-C₁-C₆-alkylene-.”

Thus, if literally based on the description, claim 18 would read:

“18. ... according to claim 14 ...and the diphospine is of formula XLIII



and R₄₁ is a monovalent radical of a ditertiary diphosphine, with the CO group being attached directly to a carbon or nitrogen atom of R₄₁ the diphosphine skeleton, or to an oxygen or nitrogen atom or to a carbon atom of a bridging group present between the CO group and R₄₁ of the diphosphine skeleton.”

In view of the comments above applicants submit that there is no conflict between claims 14 and 18 at all.

Regarding the term "ditertiary diphosphine"

a) Excerpt from the Office Action dated July 17, 2007, page 7, lines 1 to 3:

“Further, applicants are missing the point that the Examiner makes here. The adjective here, tertiary, could refer to the P, but it could just as well refer to the substituent on the P.”

It seems this is the key point for the difficulties of the Examiner for accepting applicants' term “tertiary” in “ditertiary diphosphine”.

However, is it not the case that a molecule RNH₂ is called a “primary amine”?

Is it not the case that a molecule R₂NH is called a “secondary amine”?

Is it not the case that a molecule R₃N is called a “tertiary amine”?

Is it not the case that in each case the adjective refers to the nature of N-atom (being bound to three C-atoms) and says nothing about the nature of the radical R?

With “tert-butylamine” we still have a primary amine, as it is $(\text{CH}_3)_3\text{-NH}_2$ and the “tertiary” refers simply and explicitly to the nature of the butylgroup.

So to what can “tertiary” in “tertiary phosphine” refer in view of the above? It must be the phosphorous atom if adopting the nomenclature for amines as there is no reference to any bound groups/radicals.

Following the logic of the Examiner, assuming “tertiary” could still possibly refer to the radicals bound to the phosphorous atom(s) and not to the phosphorous atom(s) itself, it seems this would mean that each and every radical bound to each phosphorous atom must be of tertiary nature. However, this seems unrealistic, and there is clearly nothing in the instant description to support this assumption. As the Examiner knows, the claims are interpreted in view of the specification.

Further in support of applicants view the Examiner might consider:

b) Excerpt from US 6,683,206 B2, col. 5, lines 19-21:

“Chiral ditertiary diphosphines whose phosphino groups in the 1,2, 1,3 or 1,4 position are bonded to a $\text{C}_2\text{-C}_4$ carbon chain are often used as ligands.”

Please compare with the instant definition on page 19, lines 10-12:

“The achiral and chiral ditertiary diphosphines may also be ones in which the phosphine groups are attached (a) to various carbon atoms of a carbon chain having 2 to 4 carbon atoms, or (b) directly....”

These are almost identical definitions. Clearly, each phosphine in a ditertiary diphosphine is a tertiary phosphine and therein tertiary refers to the nature of each phosphorous atom.

c) Finally, according to instant page 39 “BINAP” is a “ditertiary diphosphine”:

A search for “BINAP” in the Internet reveals that BINAP is a “chiral diphosphine” and further “BINAP” represents “an optically active tertiary phosphine.” Combined it appears proper to call “BINAP” to be a “ditertiary diphosphine.”

In view of the above, applicants request that the USPTO accept the term “ditertiary diphosphine” as definite.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

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